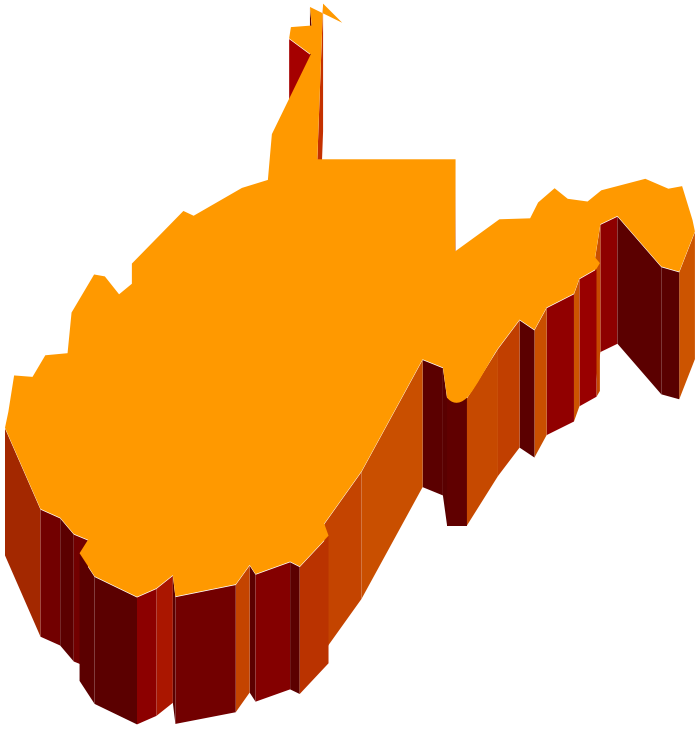
WEST VIRGINIA



GRASSLAND

EVALUATION

CONTEST

GRASSLAND EVALUATION CONTEST

TEACHER'S GUIDE

INTRODUCTION

The Grassland Evaluation program consists of four sections: 1) Grassland Condition, 2) Soil Interpretation, 3) Wildlife Habitat, and 4) Plant Identification. Each of these factors must be considered in evaluating pastures to best utilize the resource and to help make useful management decisions.

CONTEST LAYOUT

The judging site will be a typical pasture or area used for livestock grazing. Within the pasture area, a 50 x 50 foot plot will be marked off with stakes. Participants will not be allowed to walk into or touch plants within this plot. This area will be used by the participants to answer certain sections of the Wildlife and Pasture Evaluation Scorecards. Additional stakes at or near this site will be used to determine the percent of slope as required for the Soils Scorecard. Additional areas or sites will be designated by contest officials as needed to complete the contest.

A "scenario with landowner's goals for livestock and wildlife production" will be provided at the contest site. Appropriate soil survey information, aerial photos, maps, scorecards and any other relative information will be made available to the contestants on the day of the contest. This information must be considered to complete the scorecard.

Plants marked for the Plant Identification portion of the contest will be marked in the field. Depending on the availability, certain plants may be potted specimens. Participants will not be allowed to touch the plants marked for this section of the contest.

GRASSLAND CONDITION

Grassland evaluation is a process of appraising the present conditions in a field and making decisions to correct problems or to utilize the resource in a manner that best suits the landowner's goals.

Many problems in grasslands and pastures develop from mismanagement or lack of planning. In order to correct problems, you must first determine the condition of the field then make corrective decisions that are based on sound agricultural practices compatible with the landowner's goals. The landowner's goals will be provided for each judging site. **Livestock production should be the primary interest for the field when filling out the Grassland Condition scorecard with wildlife as a secondary goal.**

WILDLIFE HABITAT

To increase wildlife numbers, you must provide adequate food and permanent cover the year round. Wildlife numbers cannot increase if food or cover is continually grazed and trampled by livestock throughout the year, especially in the winter. **When scoring the Wildlife Habitat scorecard, consider wildlife improvement as the primary goal for the field with livestock production as only a secondary goal. Management decisions may differ between the two uses.** Certain portions of the Wildlife scorecard will be answered by referring to the 50 x 50 plot.

SOIL INTERPRETATION

Soil properties strongly influence both forage selection and field management. Soil surveys published by the Natural Resources Conservation Service are basic tools to the grassland manager. They provide information about the properties of all the soils in a county.

The adaptation of plants to certain soils is also an important aspect of grassland management. Some plants thrive in deep, well-drained soils, but do poorly in shallow, poorly drained soils. Factors that limit plant adaptation may be soil fertility, poor soil drainage, soil depth or droughtiness. A successful grassland manager determines the soil type and matches adapted forages to that environment.

Soil survey information will be provided at the judging site. The correct soil series must be determined by locating the judging site and soil-mapping unit on an aerial photograph of the farm. The soil's slope will be determined using the site that is identified with stakes.

PLANT IDENTIFICATION

You cannot successfully manage grasslands without a working knowledge of plant identification. You must be able to identify the plants you are managing and also the weedy invaders that might occur. A basic knowledge of the plants that are considered good food for wildlife is necessary to successfully increase numbers. It is also important to know the life cycle of the major plants found in grasslands and pastures. Perennial plants are managed differently than annual plants. Likewise, control of undesirable plants depends upon whether it is an annual, perennial, broadleaf, grass or grass-like plant.

GRASSLAND EVALUATION CONTEST

RULES

Rules during competition:

- A contest team will consist of a maximum of four (4) or a minimum of three (3) students who are currently enrolled at the high school level (FFA or 4-H).
- Team members who have been on the state winning team for 2 years or on the national winning team for 1 year are ineligible for competition.
- Contestants will be supplied scorecards, appropriate maps or aerial photos and any necessary information. All scorecards, maps and aerial photos will be collected at each judging site.
- Contestants will fill out their name and school name on the scorecard. If this information is left off of the scorecard, the individual will receive a zero (0) on the score sheet.
- Contestants will be allowed twenty-five (25) minutes to judge each of the four (4) segments of the contest with three (3) minutes to move between judging sites. Total contest time is approximately two (2) hours.
- Contestants may use non-programmable hand held calculators. Each participant will furnish their own pencils, calculator, and clipboard.
- Contestants will NOT be allowed to:
    1. Talk to anyone during the contest or use other printed material for reference.
    2. Touch plants for plant identification.
    3. Leave the contest site during the contest. THERE WILL BE NO EXCEPTIONS.
    4. Step into or touch plants within the 50 x 50 plot.
- Only contestants and officials will be allowed within the contest area during the contest.
- **Judge's decisions will be final concerning any questions involving the contest.**

SCORING RULES AND ADDITIONAL GUIDELINES

- The winning team will be determined by adding together the highest three (3) team member's scores. If less than three (3) members of a team are present, they may enter and compete as individuals.
- In case of a tie score, the Plant ID score will be used to determine the winner. Should this score also result in a tie, the grassland condition score will be used. If a tie still exists, the team with the highest individual score will determine the winner.
- The highest scoring team will represent West Virginia in the Mid-America contest in Missouri. If this team cannot go to the Mid-America contest, the second place team will serve as the alternate.
- A maximum of $1,000.00 will be provided to members and coach of the team representing West Virginia at the Mid-America Contest to help cover travel expenses to the contest.

GRASSLAND CONDITION

Profitable grassland management for livestock pasture depends upon the manager's ability to match forage growth and livestock nutritional needs. Every livestock producer must first be a "grass farmer" since ruminant livestock depend directly on the quality and quantity of forage available. Shortages of forage quality or quantity at critical periods of the animal's productive cycle results in loss of production. Livestock production can never reach an economically optimum level on improperly managed pastures. This unit will discuss principles that can be used to match forage growth with animal nutritional needs to develop pasture programs.

USING FORAGES TO FILL GRAZING SEASON

Understanding forage growth is a key to any successful pasture program. No single forage provides adequate year-round grazing, but complimentary combinations of several forages including both cool season and warm season forages can provide good quality season-long grazing including winter grazing. Forage selection for a pasture program is sometimes difficult due to the wide variety of forages available. The following section discusses the appraisal of existing conditions in a pasture.

APPRAISAL OF EXISTING CONDITIONS

1. WHAT IS THE PASTURE TYPE (% DRY MATTER)?

A. Fescue (>90% Fescue)
B. Mixed cool-season grasses (<10% legume)
C. Cool-season grass dominant (10-25% legume)
D. Cool-season grass / legume (26-60% legume)
E. Legume dominant (>75% legume)
F. Warm-season grass dominant (<40% other species)

FESCUE (>90% FESCUE)

Tall Fescue is a major cool season grass in West Virginia. Fescue pastures have Kentucky 31 as the dominant forage species. Active growth periods of tall fescue occur in spring and fall. Fescue pastures need nitrogen fertilization to produce good forage yields. Soil test fertilizer recommendations for cool-season grass pasture should be followed to achieve desired yield levels. Besides providing forage in spring and fall, tall fescue is often managed for winter pasture. Fall growth of tall fescue is allowed to accumulate and grazing is deferred until winter. This practice is called stockpiling and works well in fall because the accumulated growth tends to remain high in nutritive quality and does not become mature as it does in spring. Tall fescue tolerates freezing weather better than most other cool season grasses so it is preferred for fall stockpiled pasture.

Many tall fescue pastures are infected with the fescue endophyte, which cause fescue toxicosis in grazing animals. Fescue toxicosis is caused by a toxin produced by an endophytic fungus that grows inside the plant. Animals grazing fescue pastures that are infected with the endophytic fungus can show symptoms of lameness, heat stress,

lower weight gains, low milk production, and low conception rates all of which reduce farm profitability. Grazing management can often offset the fescue endophyte problem on a farm. If the fescue is kept vegetative, the fescue toxin does not seem to be as prevalent. Incorporation of legumes also seems to help dilute the toxicity of the fungus. Endophyte-free fescues are also available. Fescue pastures usually have low value for wildlife due to the density of the foliage at ground level.

MIXED COOL SEASON GRASSES (<10% LEGUMES)

Mixed cool season grass pastures consist of a mix of cool season grass forages that may or may not include tall fescue. This category can also include pure stands of other cool season grasses besides tall fescue. Perennial cool season grasses adapted to West Virginia include Kentucky bluegrass, orchardgrass, perennial ryegrass, redtop, tall fescue, and timothy. These grasses can be found in either pure stands, in mixtures with other cool season grasses or in combination with legumes. Mixed cool season grass stands should receive nitrogen fertilization. The low percentage (10%) of legumes is considered insignificant nutritionally. Soil test fertilizer recommendations for cool season pasture should be followed to achieve desired yield levels. Cool season grasses are not often seeded in mixtures with warm season grasses in the same field because this combination requires very careful management to maintain the mixture.

Cool season grasses grow best during spring and fall, but are usually dormant or unproductive during hot summer months. From one half to two thirds of the annual growth of cool season grasses occur in the spring and up to one third occurs in the fall. Forage quality is very high when new growth begins in spring and declines with increasing growth as the plants become mature and produce seed. Fall re-growth of cool season grasses also has very good forage quality, however forage quality does not decline during the fall growth phase as in spring because plants remain vegetative during this time of the year. Cold weather, snow, or ice can cause forage quality to decline during winter months, except for fescue.

COOL SEASON GRASS DOMINANT (10 TO 25 % LEGUME)

Cool season grass dominant pastures generally do not need nitrogen in the spring, but may respond well to nitrogen in the fall. These pastures can include fescue and/or a mix of cool season or warm season grasses along with a moderate percentage of legumes. Legume percentages in this range will improve the nutritional value of a pasture and will help offset the effects of the fescue endophyte in cattle, but are not high enough to eliminate the need for nitrogen fertilization under high animal stocking rates. Soil test fertilizer recommendations for cool season grass should be followed to achieve desired yield levels. However, if the goal of the landowner is to increase the percentage of legume in the pastures then soil test fertilizer recommendations for clover/grass pasture should be followed to encourage legume growth. The legume component also helps extend the active spring growth period of the pasture into early summer. Other grasses including warm season grasses or weedy grass may be present at levels less than 25% of the pasture mix.

COOL SEASON GRASS/LEGUME (26 TO 60% LEGUME)

Legumes are commonly grown in combination with cool season grasses to improve nutritional quality of the pasture. Legumes are highly palatable and nutritious to livestock. Legumes generally have higher nutritive quality at any given growth stage than grasses. Legumes also help improve forage quality of a pasture when the companion grasses in a mixture become more mature than desired. Forage quality of grass/legume mixtures is excellent and livestock grazing this mixture should have few symptoms from fescue endophyte. Grass/legume pastures show little or no response to nitrogen fertilization because the nitrogen supplied by the legume through nitrogen fixation is high enough to support the growth of the grass and legume. Legumes need higher soil fertility levels than grasses. Soil test fertilizer recommendations for clover/grass pasture should be followed to maintain production in this mixture. Grass/legume pastures also have more value to wildlife than fescue, mixed cool season or cool season dominant pastures.

LEGUME DOMINANT (>75% LEGUME)

Fields with this high percentage of legume are more typical of hayfields than of grazed pastures, but legume dominant fields used for pasture will have the same benefits as listed for grass/legume pastures. Legumes can be used for pasture in spring, summer or fall, but require careful management to maintain adequate stands. Legumes also help offset the effects of fescue toxicosis when mixed in fields of endophyte infected tall fescue. Soil test fertilizer recommendations for clover/grass pasture should be followed to maintain production in this mixture.

Legumes adapted to West Virginia include alfalfa, lespedeza, red and white clover, and birdsfoot trefoil. Red and white clovers grow in spring, early summer and fall. Alfalfa and birdsfoot trefoil grow from spring through summer and fall. Annual lespedeza grows in the summer and dies at frost. All of these are perennial plants except for annual lespedeza and red clover.

WARM SEASON GRASS DOMINANT (<40% OTHER SPECIES)

Warm season grasses grow best in the summer months but grow very little in spring and fall. Warm season grasses provide good quality, actively growing forage during the hot summer months when cool season grasses and many legumes are dormant or unproductive. Warm season grasses should be used when cool season forage availability is low in summer or when very high summer forage production is needed. A combination of warm season and cool season grass pastures will provide a constant forage supply over the growing season. Keep in mind that warm and cool season grasses should be planted in separate pastures for easier management.

Warm season grasses are usually grown in pure stands or in mixtures with other warm season grasses. They are usually not grown in combination with most introduced legumes or cool season grasses because the warm season grasses are not as aggressive as many legumes or cool season grasses especially in fertilized pastures. These grasses should not be grazed shorter than eight inches to maintain vigor and re-growth of the plants. Warm season grasses respond to moderate fertilizer applications and are much more desirable for wildlife cover than cool season grasses. Warm season grasses such as bermudagrass and Caucasian bluestem respond to high rates

of nitrogen fertilizer, but have little value as wildlife cover. Fertilizer recommendations for warm season grass pasture should be followed for all warm season grass pastures except for bermudagrass which has a specific recommendation listed for hay or pasture. Annual grasses, forbs, legumes, and cool season grasses often become established in a warm season grass pasture through seed dispersal or improper grazing or feeding management. These invading species should be maintained at less than 40% of the sward so the benefits of the warm season grass can be realized.

Warm season grasses should be grazed when they are in the vegetative stage of growth. Fiber levels increase rapidly as the plants mature, reducing forage quality and making warm season grasses undesirable for stockpiling for later grazing. These grasses usually have a very rapid growth rate and very high production potential. Close attention is required to prevent them from becoming too mature for good forage quality.

2. WHAT IS THE AVERAGE GROWTH STAGE OF THE DOMINANT FORAGE SPECIES?

A. Vegetative
B. Boot or bud
C. Heading or bloom
D. Mature
E. Dormant

The growth stage of the forage is very important in pasture management. As the forage matures the nutritional value and acceptability to grazing animals decline rapidly. Forages should be grazed before they reach maturity since nutritive quality is highest when the forage is vegetative and growing. This stage also corresponds with low plant fiber and high digestibility of the forage. Plants go through specific developmental stages as they mature. For grasses these stages are vegetative, boot, heading or bloom and mature. Most cool season grasses produce seed only in the spring. Re-growth of cool season grasses in summer and fall after the seed stems have been removed by grazing or hay harvest is vegetative and leafy with no seedheads. Warm season grasses can produce seed more than once per year. Legumes go through similar stages of development as the grasses. These stages for legumes are vegetative, bud, bloom and mature. Unlike most grasses, legumes except for annual lespedeza can flower and produce seed several times during the growing season.

3. WHAT BEST DESCRIBES THE GRAZING PRESSURE OF THE PASTURE?

A. Spot grazed
B. Evenly grazed

Spot Grazed: Spot grazed is actually a form of overgrazing in which spots or patches of a pasture are grazed too frequently. Spot grazing occurs during periods of active forage growth when livestock graze spots in a pasture while allowing other areas of the field to become mature and unpalatable. The re-growth of the grazed forage in spots is often more palatable than the forage left ungrazed so the grazing animals frequently re-graze new growth of these spots. Spot grazed fields have uneven forage heights and

the forage in the grazed spots may become weak and thin if cattle remain in the field too long. Spot grazing often occurs when livestock density or number in a pasture is too low for the current forage conditions. Frequent pasture rotation will improve the condition of spot grazed pastures.

Evenly Grazed: Evenly grazed pastures, as the description implies, have a generally uniform grazing height, thick stands, good forage vigor, and respond well to good management. These pastures often have a good mix of grasses and/or legumes present. Some spot grazed areas may be present, but make up less than 20% of the field.

4. IS WEED OR BRUSH CONTROL NEEDED OTHER THAN BY GRAZING OR SOIL FERTILITY MANAGEMENT?

A. Yes
B. No

Weed and brush control is sometimes necessary to control certain invading species. Many weedy plants can be controlled by good grazing management and proper use of fertilizer. Forage plants growing in pastures that have good soil fertility and are not overgrazed are more competitive and prevent many weeds from becoming established. Other means of control, including mechanical or chemical control, become necessary when woody plants and other undesirable species make up 30% or more of the canopy in a pasture. Mechanical, chemical or spot treatment of thorny species may be necessary at levels of 10% canopy.

5. WHAT SOIL pH RANGE IS RECOMMENDED FOR THIS SWARD?

A. 4.5 – 5.0
B. 5.1 – 5.5
C. 5.6 – 6.0
D. 6.1 – 6.5
E. 6.6 – 7.0
F. 7.1 – 7.5

Most legumes need a higher soil pH than most grasses. Recommended soil pH levels for forages range from 5.6 to 6.5, but certain crops require higher soil pH within this range.

Soil pH is a measure of the acidity or alkalinity of the soil. A pH of 7 is neutral, meaning it is neither acidic nor basic. Low soil pH can have a dramatic impact on forage growth and persistence. The acidity of a soil increases by a factor of 10 for each integer below a pH of 7. For example, a pH of 6 is 10 times more acidic than a pH of 7, a pH of 5 is 100 times more acidic than a pH of 7.

Desired soil pH ranges for crops

Crop	pH
Alfalfa and alfalfa-grass establishment	6.1 – 6.5
Birdsfoot trefoil and birdsfoot trefoil-grass establishment	5.6 – 6.0
Clover and clover–grass establishment	5.6 – 6.0
Cool-season grass establishment and production	5.6 – 6.0
Lespedeza and lespedeza-grass establishment	5.6 – 6.0
Overseeding legumes	5.6 – 6.0
Warm-season grass establishment and production	5.6 – 6.0
Sudan grass and sudan / sorghum crosses	5.6 – 6.0
All row crops	6.1 – 6.5

6. WHAT FERTILIZER RATE IS RECOMMENDED FOR THIS SWARD?

Fertilizer recommendations are given on the West Virginia University soil test results. There are two types of fertilizer recommendations to be made. One is establishment and one is production. Recommendations for pounds of nitrogen, phosphorus, and potash are given to reach the yield goal for this particular crop.

7. WHAT LIMESTONE RATE IS RECOMMENDED FOR THIS SWARD?

Limestone recommendations are listed in the West Virginia Soil Test Results.

MATCHING LIVESTOCK AND FORAGE

1. WHEN DOES THIS LIVESTOCK HERD HAVE THE HIGHEST FORAGE QUALITY REQUIREMENT?

A. Spring
B. Summer
C. Fall
D. Winter
E. Requirement is high all year

Livestock nutritional requirements change throughout the year as the animals go through different stages of production. Forage quality must be higher for growing animals than for mature animals. Growing animals, such as steers or heifers, need a constant supply of high quality feed through the season to maintain growth. Shortages in quality will sharply reduce gain and profit. As an animal matures, its nutritional needs change. The forage quality and quantity needed by mature animals also changes with production stage through the year.

A mature beef cow goes through four stages of production each year. Nutritional needs will be different for each of these stages.

STAGE ONE is post calving and lasts 90 days. Since the cow has just had a calf, her nutritional needs are now the highest of the entire year. She is lactating at her

highest level, she is undergoing uterine involution, and she must cycle and rebreed within 90 days of calving to stay on a 12 month calving schedule in the herd. Lack of nutrition during this period results in lower milk production and failure to rebreed on time. A cow must rebreed in time to have a calf every 365 days. Failure to do this results in an unprofitable operation due to added costs of maintaining open cows.

STAGE TWO the cow is pregnant and lactating. This stage usually lasts 115 days. Nutritional needs will be dropping slightly during this period. The cow is in the early stages of pregnancy while still nursing her calf. She should be gaining some weight now.

STAGE THREE is mid gestation and lasts about 100 days. The cow has just weaned her calf and she is dry. Her nutritional needs are at the lowest point of the entire year since she only has to maintain herself and the developing fetus. She can get by on much lower quality pasture now than in stage one.

STAGE FOUR is pre-calving. This stage lasts about 60 days and is the second most important period during the year. Seventy to eighty percent of fetal development is occurring. The cow is gaining weight and preparing for lactation. Inadequate nutrition during stage four will often cause weak calves and poor rebreeding success during stage one. Cows need to be in good body condition now. She needs good quality pasture or hay to make sure both herself and the calf will be strong and healthy. First or second calf heifers need higher quality forage than mature cows during all four of these stages since their bodies are still growing plus they are producing a calf. This makes it very important to feed these animals separately from the mature animals to ensure proper development. Mature bulls also need good quality feed during the breeding season but can get by on lower quality forages other times of the year.

A cow herd has its highest forage quality requirement during stage one, which is calving and rebreeding. This stage usually occurs in spring and fall in West Virginia. Herds that have no set calving season or those that calve year round need high forage quality year round to support the cows calving at any given time. Year round calving is not recommended. Calving seasons of 90 days or less are recommended to optimize forage production, breeding and marketing.

2. DOES THE GIVEN SYSTEM'S GROWTH CYCLE MATCH THE SEASONAL PEAK NUTRITIONAL NEEDS OF THIS LIVESTOCK HERD UNDER PRESENT MANAGEMENT?

A. Yes
B. No

Now that you know some basic concepts of forage production and changes in livestock nutritional needs, you still face the challenge of matching these production schedules together. A good manager relies on his ability to combine the production of forage and livestock along with the environment into an economically and biologically sound program.

Springtime is the period when forage is abundant and the weather is favorable for calf survival and rapid growth. Most pastures in West Virginia are made up of cool season forage species. A spring calving program matches the cool season grass seasonal growth pattern rather well. The cow's greatest nutritional needs are between calving and rebreeding. The growth and quality of a cool season grass is also high at this time. Forage production and quality drop off in summer along with a slight drop in

nutritional requirement by the cow. Adding a warm season grass or other summer forage to a cool season grass program fills the summer forage deficit and maintains livestock production until the cool season grass begins growing again in fall.

Summer calving is not recommended in West Virginia. The reason for this is not entirely related to forage production since warm season forages are available and of high enough quality to maintain adequate nutrition. The primary reason not to have a summer calving season is due to weather. In summer, high temperatures and humidity reduce breeding activity and conception rates. Research has shown much lower conception rates in cattle breeding during hot weather because of higher embryonic mortality. The number of calves weaned per cow exposed to the bull has much greater impact on profitability than any other single factor. If a calf is never conceived it cannot be weaned.

Fall calving works well in West Virginia since the combination of forage quality and cooler temperatures are again favorable for high conception rates in cows. Cool season grasses produce about one third of yearly production in the fall. The quality of this fall growth is very good. Cows calving in September will have adequate nutrition on poorly managed fall pastures. Rebreeding will take place after the cows have been flushed with high quality fall pastures. Warm season pastures can improve a fall calving program by increasing the nutrition of the cow during Stage 4, which occurs during July and August for a fall calving herd. This improves milk production, calf vigor, and rebreeding success. Warm season pastures also work well if fall born calves are kept until they are yearlings before they are sold. The calves are weaned in spring and put on high quality spring pasture. In early summer the calves are rotated to warm season pastures to maintain good weight gains until they are sold later that summer or in the fall.

Winter calving is not recommended in West Virginia. The reason for this is due to adverse weather conditions for calving and not matching forage production with peak nutritional demands. Management of forage resources through the wintertime may be the most cost-effective practice a producer can use. Stock piling of forages, especially tall fescue, grazing crop residues, and planting winter annual forages can drastically reduce a producers winter feed cost when compared to hay and/or supplements. Research has shown that with proper management and utilization the quality of stockpiled tall fescue and winter annual forages can meet the needs of most beef animals including lactating cows.

3. HOW MANY POUNDS OF FORAGE DRY MATTER DOES THIS HERD NEED TO CONSUME PER DAY DURING EACH OF THESE SEASONS?

	Lbs. DM needed
Spring	_____
Summer	_____
Fall	_____
Winter	_____

CALCULATING FORAGE DRY MATTER INTAKE REQUIREMENTS

Although cattle need certain forage quality at specific stages of production, they also need adequate quantity. Estimating the total forage need is not difficult but will require some calculation. The pasture stocking rate and hay supply can both be estimated in advance if animal needs and forage production is known.

Forage requirements vary not only with the animal's stage of production, but also by body size. Large animals need more feed to maintain themselves than do smaller animals. The following table gives guidelines for estimating forage Dry Matter Intake (DMI) by certain classes of animals. These figures are given as a percent of body weight (BW) to account for the difference in forage requirement due to body size. **NOTE: Notice that the percentage of forage DMI changes for each stage of production as already discussed in question 1 of this section.**

Approximate Daily Forage DMI Requirements

Animal	Daily forage DMI (%BW)
Dry beef cow	2%
Lactating beef cow (avg. milk production)	2.5%
Lactating beef cow (superior milk)	3%
Bull (during breeding season)	2.5%
Bull (non-breeding)	2%
Growing steers and heifers	3%

The following example illustrates how to calculate forage DMI requirements.

Example: Calculate the daily forage DM needs of this herd during the spring grazing period.

Spring calving herd.
30 cows – lactating (avg. production) (avg. wt. 1,100 lbs.)
1 bull – 2,000 lbs.
10 heifers – avg. wt. 750 lbs.

Solution: 30 lactating cows X 1,100 lbs. = 33,000 lbs.
1 breeding bull X 2,000 lbs. = 2,000 lbs.
10 heifers X 750 lbs. = 7,500 lbs.

The cows are lactating so their requirement is 2.5% of their BW per day. During the breeding season the bull still needs 2.5% of BW also. The growing heifers need 3% BW per day.

33,000	X	0.025	=	825
2,000	X	0.025	=	50
7,500	X	0.03	=	225

1,100 lbs. forage dry matter needed per day

Example: Calculate the daily forage dry matter requirement for the same herd if the cows are dry in STAGE 3.

Solution: The herd needs less forage because the cows are dry and their nutrition and DM requirements are lower. The heifers are still growing so they still need 3 % of their BW per day. The cows and bull can calculate at 2%.

30 dry cows (1,100 lbs. avg. wt.) = 33,000 lbs.
1 bull (2,000 lbs.) = 2,000 lbs.
10 heifers (750 lbs. avg. wt.) = 7,500 lbs.

33,000	X	0.02	=	660 lbs. per day for cows
2,000	X	0.02	=	40 lbs. per day for bull
7,500	X	0.03	=	225 lbs. per day for heifers
				925 lbs. forage DM needed per day for this herd

4. IS FORAGE AVAILABILTY ADEQUATE FOR THIS HERD IN EACH OF THESE SEASONS?

- Spring (100 days)
  _____ Adequate
  _____ Not adequate
- Summer (100 days)
  _____ Adequate
  _____ Not adequate

- Fall (100 days)
  _____ Adequate
  _____ Not Adequate

CALCULATING FORAGE DRY MATTER REQUIREMENTS FOR A SPECIFIC SEASON

To calculate the forage DMI requirements for a specific period use the following calculation (lbs. dry matter needed per day) X (number of days in the season)

Example: What is the forage DMI requirement for this same herd during the spring (100 days)? This is a spring calving herd.

Solution: Since the herd is spring calving, the cows will be in STAGE ONE. They are lactating and preparing to rebreed. Their requirements will be 2.5% of BW per day. The bull will be working during this time so his need is 2.5% of BW per day. The heifers will be bred this spring so their need is 3% of BW per day.

The total daily forage DMI need is 1,100 lbs.
1100 lbs. /day X 100 days = 110,000 lbs. forage DMI needs for spring season

CALCULATING ACTUAL FORAGE AVAILABILITY REQUIRED FOR DIFFERENT GRAZING MANAGEMENT SYSTEMS

To determine if forage availability is adequate for the herd, you must also consider the harvest efficiency of the grazing system. No harvest system is 100% efficient, especially grazing animals. In a pasture system animal utilization of forage is between 30 and 65 percent of what is actually grown. In continuous grazing systems cattle are allowed to continually graze a pasture with no restrictions on rotation. Much of what is produced is wasted. Only 30 to 35 percent of the total forage produced is actually eaten by livestock. The other 65 to 70 percent is trampled, soiled by mud, manure, and urine, or used as bedding areas.

As grazing management restricts the grazing habits of the animals, forage utilization increases. When management-intensive grazing (MIG) is used, forage utilization can be as high as 65 percent of the forage produced. This level of utilization can only be achieved with a multiple paddock system with frequent pasture rotations of 3 days or less.

The following gives a guideline for calculating the actual amount of forage dry matter production needed in a pasture to carry the same herd during the spring season.

Example: Same herd as used previously. Calculate the amount of forage DM needed for this herd for the spring grazing period for continuous and management-intensive grazing systems.

Solution: The daily DMI was calculated to be 1,100 lbs. and the total spring season DMI was 110,000 lbs. Forage utilization in the continuous grazing pasture management system is only about 35 percent. This means that forage DM availability needs to be almost three times the amount the herd will actually eat per day.

$$\frac{\text{110,000 lbs. DMI per day}}{0.35} = \text{314,285 lbs. forage DM needed for that season}$$

In an intensive grazing management system, forage utilization is about 65 percent. Therefore, actual forage DM needed is only about 1.5 times as much as what is actually eaten.

$$\frac{\text{110,000 lbs. DMI per day}}{0.65} = \text{169,230 lbs. of forage DM needed for that season}$$

It becomes quite clear that by using good grazing management a producer can harvest almost twice the forage with little extra cost except for fencing materials. The added utilization of forage and extra livestock gain per acre can often pay that cost very quickly.

PASTURE IMPROVEMENT

The answers to questions 3, 4, 5 in this pasture improvement section are based on the choice for question 2.

1. WHAT CHANGES SHOULD BE MADE IN LIVESTOCK MANAGEMENT?

A. Continue present management
B. Reduce livestock numbers
C. Change calving season to a different time of the year
D. Shorten calving season to a period < 90 days.
E. Provide higher quality pasture
F. Switch to a management intensive rotational grazing system

Continue present management: Use this option when the livestock management practices match with the landowner's goals and forage management.

Reduce livestock numbers: Use this option when the livestock numbers exceed the carrying capacity of the farm even when calculated for a different grazing management system. Calculating the forage requirement using the utilization percentage for management intensive grazing may allow the farmer to keep the herd at its current size if livestock numbers are too high for a continuous grazing system.
NOTE: The goals stated by the landowner may also dictate reducing livestock numbers regardless of the carrying capacity for the farm, but this will be specifically stated for the contest.

Change calving season to a different time of the year: spring or fall calving is recommended for West Virginia conditions. Summer calving should be avoided due to the potential of low cow conception rates caused by hot weather.

Shorten calving season to a period of <90 days: Use this option when the calving season is spread out over more that one season for that single herd or when year round calving is being practiced.

Provide higher quality pastures: This option should be chosen when the farm scenario states that the farmer has problems with low weight gains, low conception rates and/or low weaning weights or when fescue endophtye is a problem.

Switch to a management intensive rotational grazing system: Switching to a rotational grazing system may improve forage availability if the carrying capacity of the farm is exceeded under continuous grazing management. Management intensive grazing also reduces problems with spot grazing in pastures. This option should be chosen when there is a shortage of forages.

2. WHAT TYPE OF ADDITIONAL FORAGE IS NEEDED TO IMPROVE THIS FORAGE PROGRAM?

A. Cool season grasses
B. Warm season grasses
C. Legumes
D. No additional forages needed – use existing pastures

Additional forages should be chosen based upon information given in the farm scenario and the forage availability calculations. The options listed above can be used as shown in the following situations; however information given in the farm scenario will be specific enough so that only one will be the best answer.

Example: Cool season grasses can be used when forage production is not adequate in spring and fall but is adequate for summer. Warm season grasses can be added to the system when summer forage production is not adequate. Legumes can be selected if overseeding of legumes in winter is needed. Grass/legume mixtures can be used for providing high quality pasture. If the system is functioning well, choose answer E. No additional forages needed – use existing pasture.

3. HOW SHOULD THIS ADDITIONAL FORAGE BE PLANTED?

A. Plant on a clean, firm seedbed
B. No-till plant in a killed sod
C. Overseed or interseed in a closely grazed sod
D. No additional forages needed – use existing pasture

Plant on a clean, firm seedbed: Planting a stand of forages is best done on a clean-tilled, firm seedbed when conditions allow. This allows better weed control, fertilizer and lime incorporation, and better seed to soil contact. This option should be chosen when field renovation is desired and lime and fertilizer need to be incorporated into the soil.

No-till plant in a killed sod: No-till planting into a killed sod should be chosen when soil erosion could be a hazard if the field is plowed or if the field is too rocky to be plowed. No-till planting allows the seed to be planted by a no-till drill directly into a sod that has been killed by herbicides. This option should be chosen for fields to be renovated having over a 5% slope.

Overseed or interseed into a closely grazed sod: This option should be chosen when adding legumes to a grass pasture to improve forage quality. Overseeding is done during the winter months so that freezing and thawing of the soil will cover the legume seed. Legumes can also be interseeded with a no-till drill into the existing live sod.

No additional forages needed – use existing pasture: Choose the option for fields with adequate stands of desired forage and which require no additional forage species.

4. WHAT FERTILZER RATE IS NEEDED FOR THIS FORAGE?

Fertilizer recommendations should be selected from the soil test that corresponds with the crop chosen in question 2. If you chose the “establish a new forage” in question 2 you must also choose a fertilizer recommendation for establishment of that forage. If you choose to continue with the present forage, use a recommendation for pasture production of that forage.

5. WHAT LIMESTONE RATE, IN TONS PER ACRE, IS NEEDED FOR THIS FORAGE?

Limestone recommendations should be selected from the soil test that corresponds with the crop chosen in question 2. The amount of limestone needed in tons per acre should be calculated using the same method as in question 7 of the “appraisal of existing conditions” section.

WILDLIFE HABITAT

Grasslands are a vital component to most West Virginia wildlife. There are roughly 1.2 million acres of grasslands scattered throughout West Virginia that provide food and cover for a variety of species. Most wildlife prefer a mosaic of vegetative habitats to meet their daily and seasonal requirements for survival. Grassland (pasture or hayfield) is only one component of that mosaic but provides elements such as nesting cover, food and forage or loafing areas for a variety of species. Since livestock are usually confined to grasslands by fences, their forage needs must be supplied within a given area. Wildlife are not confined by fences and will seek out food and cover as required. Wildlife are able to move back and forth through different habitat types found in a location and rarely stays in the same component for long periods of time. However they require that these habitat components be located close together for safety of movement. Pastures and hayfields that are isolated from other habitat components are of little value. Woody cover for protection, idle fields for nesting, and weed seed and crop residues for food are all important components that must be located close to a grassland. A few of the other components are described below.

Plant varieties and densities needed depend upon the species of animals that use the area. The number of seed-producing plants in a grassland will determine its value to species such as quail, because quail and many songbirds require seeds in their diet. Generally, the more kinds of seed-producing plants there are, the more value the field will have for a variety of species. In addition, rabbits and many small mammals consume the vegetative parts of grasses, legumes and other broad-leaved plants. If these plants are removed by overgrazing or late season haying, the number of animals that the area can support (wildlife carrying capacity) may reduce.

If properly managed, grasslands can also provide cover or protection for nesting, roosting or breeding. Songbirds such as bobolinks, meadowlarks, and several types of sparrows build their nest on the ground, raise their young, and feed exclusively within grasslands. Rabbits, bobwhite quail, turkey and pheasant also nest in grasslands, but prefer areas near woods or shrubby cover.

Notes: Although they do occur in West Virginia, Ring-necked pheasants and the Northern bobwhite quail are found primarily in the northern and eastern panhandles of West Virginia respectively. Songbirds are used as examples and discussed in this document because they occur throughout the state, frequently use grasslands for a variety of life functions and are good overall indicators of grassland health. However, management for grassland birds is difficult and complex. Because grasslands depend on disturbance to persist, habitat that is suitable for a species one year may be unsuitable the following year. Moreover, each grassland species has unique habitat requirements, and management that favors one species may preclude others.

Wild herbaceous plants (sometimes referred to as soft cover) are the vegetative growth consisting of native or introduced perennial grasses and broad-leaved weeds or forbs that are generally established naturally. Some examples are goldenrod, joe-pye weed, ironweed, plantain and ragweed. Domestic grasses and legumes can also provide food sources in the form of vegetative browse or the macroinvertabrates (insects) these

plants attract. Examples of domestic grasses and legumes are bluegrass, timothy, alfalfa, clover and orchardgrass.

Shrub cover (brush) consists of woody plants, usually with multiple stems that arise from a common base or dense early successional forest. These plants are generally less than fifteen feet tall at maturity. When they grow close together to form a thicket, they provide escape cover for a variety of animals such as quail, grouse and rabbits. These areas are browse for deer and the dense branches provide nesting and protected perch areas for many songbirds. Shrub cover may also consist of either evergreen or young coniferous trees and shrubs that provide mainly cover and some browse and seed. After coniferous trees become large and naturally prune and thin themselves, the value drastically decreases. Some examples are young white pine and Virginia pine, rhododendron and even some evergreen ornamentals. Deciduous shrubby cover may consist of species such as viburnums, blueberry, blackberry and rose. They typically produce fruits, buds or foliage that wildlife eat.

Woodland generally consists of perennial, woody-stemmed tree species that reach a height of over twenty feet. This element typically includes deciduous and mature coniferous trees and vines that produce food browse and cover for wildlife. In West Virginia, these are woodland areas and riparian zones or woodland patches scattered among other land use types. A diverse age and composition of plant species within these areas are important and usually desirable to provide good wildlife habitat. Some examples of our native kinds of trees are oaks, cherry, birches, maples, poplar and beech. These areas should always be protected from grazing.

It should also be noted that due to the topography of West Virginia many “seeps” or springs frequently surface in grassland areas used as pasture and hayland. These are very common in all parts of the state near the bases of hills or in small draws along slopes. While usually these areas are not large and relatively dry most of the year, they do support water-loving plants (wetland plants) and the sheer number of these areas throughout the state makes them worthy of mentioning. Making up this group are wild herbaceous and woody plants that grow on moist to wet sites but do not include submerged or floating plants. They produce food and cover for upland wildlife although they are wetland species. For example, pheasants use cattail and rushes for winter cover, while deer feed on sedges in early spring. Wild turkeys use spring seeps as a source of surface water during the spring and fall. Desirable wetland plants include smartweeds, cattails, bur-reeds, barnyard grass, rushes and sedges. Water depth and fluctuation control the establishment and growth of most wetland plants and is usually the limiting factor controlling the species and composition of wetland plants.

Cool Season Grasses

Those grasses that grow best during the cool spring and fall of the year are aptly called cool season grasses. These grasses begin their growth early in the spring when the soil temperature reaches about 40º F. Their growth slows during the warmest part of summer when the soil temperature nears 80º F and resumes again as the soil cools in the fall. Cool season grasses have been popular with farmers because they provide forage for a large portion of the year, are very easy to establish and respond quickly and noticeably to fertilization. Some examples of cool season grasses are tall fescue, Kentucky bluegrass, bromegrass, timothy and orchard grass.

Cool season grasses are usually grazed to about 2 to 4 inches in height. Grazing below this height will result in lower production, may increase soil erosion and reduce wildlife use. These grasses are normally at their peak quality and ready for cutting for hay during the peak nesting period for many ground nesting birds which in West Virginia ranges for March 15 to July 15.

A Word about Tall Fescue

West Virginia farmers use tall fescue because it is quite easy to establish, a good grass to prevent soil erosion and it tolerates a wide variety of conditions such as heavy grazing, a wide range of pH and climate. However, the attributes that make it attractive to farmers can have problematic implications for wildlife. Fescue readily invades fields and can quickly eliminate native grasses and forbs by out-competing them. In addition, its bulky thatch and residue remains on the ground if ungrazed or not harvested. This prevents movement of smaller animals and makes foraging and nesting difficult and a dangerous venture at best. Most wildlife will readily use all cool season grasses, however tall fescue is the least desirable. Depending on the management scheme, intensively grazed or frequently mowed fescue dominated grasslands offer little or no cover for wildlife and are an overall poor habitat for grassland dwelling species.

Tall fescue has been found to cause some health problems in livestock when it's infected with an endophyte fungus. It has been suggested that fescue may even harm animals such as cottontail rabbits by causing damage to the lining of the stomach and intestine.

Warm Season Grasses

Those grasses that grow best when the weather is hot and the soil temperature high are called warm season grasses. These grasses begin growing when the soil temperature is above 50º F and continue to grow during the warmest months of the year until the soil temperature reaches nearly 90º F. Although warm season grasses have a shorter growing season, they make more efficient use of water and nutrients than do other grasses.

Warm season grasses are not only good insurance against drought and summer forage shortages but they also are excellent for wildlife. Fields of these grasses may provide food and shelter for migrating warbles, thrushes, sparrows and larks in autumn. Many hawks and owls, such as kestrels and barn owl search grasslands for food throughout the winter months.

The "structure" or the way any grass grows is important to wildlife. The tall, stiff, upright stems and elevated leaves of most warm season grasses can reduce the negative effects of weather as it affects smaller warm-blooded animals. The plants can soften the impact of raindrops and modify both humidity and transpiration extremes when compared to cool season grasses. These traits can provide a more favorable breeding condition for ground nesting birds and mammals.

Native warm season grasses such as, Indiangrass, switchgrass and big bluestem grow in clumps. Open areas between clumps permit young birds and small mammals to move freely as they search for insects and seeds. The clumps also allow nests to be

built under the tufts of leaves. This lets adult birds come and go easily without delay or detection by enemies that search for the nests. Rodents and small birds are able to climb into the clump to escape drowning rains. Warm season grasses are essential to management of pheasants or bobwhite quail in West Virginia since these grasses form a more attractive habitat at ground level than do other grasses. Bunch grasses often have the habit of forming an overhead canopy of leaves which gives these birds at ground level some measure of protection from overhead predation. Young turkey poults that live on a diet of insects and few seeds also heavily use them. The growth of various broadleaf plants and the presence of many kinds of insects and spiders, make ideal growing conditions for young quail, turkey and songbirds that are just leaving the nests in search of food. In winter months and under proper management, these grasses are often taller which allows them to bend and fold under the weight of snows. This situation tends to form openings and provides winter cover for a variety of animals. Deer and groundhogs find food and shelter in all fields but don't prefer native warm-season grasses if other suitable forage is present.

Mowing of warm season grasses should be avoided (when feasible) during the peak ground-nesting season. Essentially, no harvesting should be performed prior to July 15 or August 1 in the highest elevations. When managing warm season grasses in a pasture situation, rotational grazing should always be used. Grasses should only be grazed to a maximum of 12 inches or no more than ½ of the above ground height. This height insures that ample amounts of cover, insects, and seeds are available for wildlife and it keeps the grass healthy. Some examples of the grasses that are used in grazing systems are big bluestem, Indiangrass, side-oats grama, little bluestem and switchgrass.

Historically these grasses have existed with and adapted to fire. In the tall grass prairies of the mid-west, fires started by frequent lightning strikes or as a result of sparks from trains served to reinvigorate the prairie. In earlier time, fires may also have been a result of native peoples who managed that area for hunting. Whatever the reason, wildlife managers continue to use fire to manage warm season grasses. Prescribed burning (intentional burning of stands during specific times of the year) is the most common method of management throughout much of the country. This method is still the best way to remove thatch or residue from prior growth, reduce invasion of woody species and stimulate forb growth within a stand. **In West Virginia it is extremely dangerous and difficult to attempt to manage warm season grasses with fire due to the relatively small areas of grass, extreme slope and large amounts of woodland throughout the state to which fire may escape.** Untrained individuals should not attempt this method of management.

FACTORS THAT AFFECT THE VALUE OF GRASSLANDS FOR WILDLIFE

Different species of wildlife are attracted to grasslands for different reasons. Some animals may seek nesting sites, while others may use them mainly for foraging or cover. Various factors determine the amount and type of wildlife that use any particular grassland. These factors include the grassland type, grassland composition by percent cover, the management and grassland size.

Grassland Type
Each species of grass has its own growth characteristics. Some grasses have low growing habits and form a dense mat of plant matter and roots known as a "sod". Examples of this type of grass include smooth brome, Kentucky bluegrass and Bermuda grass. Sod-forming grasses have a very high stem density at ground level and are spread primarily through rhizomes. This fact makes them less attractive to ground nesting birds and smaller animals, since they are usually not able to move through the sod.

Some grasses may grow either as a bunch grass or sod forming grass depending on the environmental conditions. Switchgrass is often thought of as a true bunchgrass, but in reality it is a sod forming grass that has varying growth characteristics. In mid-western prairies and bottomland sites it can develop long rhizomes that interlace to form a thick dense sod. Frequent disturbance helps keep this characteristic in check.

Cool season grasses are the most common grasses found in West Virginia due to climate and widespread planting for agriculture. Wildlife indeed use these areas of cool season grasses including the dense sod forming types for a variety of life activities. However, it is important to keep in mind that a mixture (or density) in composition is beneficial.

As a general rule most of the warm season stands that exist in West Virginia are relatively small. The warm season species are usually intermingled within existing stands of cool season grasses and rarely occur in large pure stands. Some warm season grasses do not form solid pure stands at all and tend to be more opportunistic such as broomsedge or purple-top grass which do not occur densely enough to be useful to most wildlife. Although these grasses may provide some habitat in terms of cover, they are not critical to the majority of wildlife.

One warm season bunchgrass that grows naturally throughout West Virginia is Indiangrass (*Sorghastrum nutans*). This handsome grass occurs in every county of West Virginia but is most common in the western part of the state where it may occur in somewhat larger stands. Other warm season grasses that may be encountered in the Mountain State include big bluestem, little bluestem and gama grass.

Switchgrass (*Panicum virgatum*) has become a staple of wildlife management for quail and pheasant. Many varieties of the grass have been developed to try to improve specific qualities about it. Varieties were propagated to improve forage quality for livestock ('Cave-in-Rock') or for reclamation purposes ('Blackwell'). In fact, one of the most common varieties used for wildlife ('Shelter') was developed in West Virginia.

Grassland Composition
Obviously grasses are the main plant component of a grassland; but some wild herbaceous plants and legumes are vital ingredients in their overall makeup giving them more productivity for wildlife and livestock. The broad leaf plants that produce seed are very important to those animals that depend upon seed for their existence. For example, the bobwhite quail is an early successional edge dwelling species. However, one of the staple foods during late summer and fall months is ragweed seed, a common

plant found throughout the grasslands of West Virginia that produces vast quantities of seed.

Legume composition within a grassland is also important to wildlife just as it is to livestock. Red and white clovers, alfalfa and other legumes play an important role in the food sources of wildlife and fix nitrogen in the soil making it available to companion plants. They provide high amounts of nutritional proteins to small mammals such as cottontail rabbits that feed on the vegetative parts of these plants, especially clovers. Estimating the amounts of legumes in a grassland in important in determining management strategies for wildlife. The necessary amount of legumes present in a grassland vary considerably by species. For animals such as the cottontail rabbit, a very high legume to grass ratio would be beneficial. While many species of songbirds would not require as many legumes, some species, such as ruffed grouse, even obtain most of their water requirements from the succulent growth of legumes.

Flowering plants and legumes are also important to butterflies and other insects that must be present to help pollinate the flowers and insure seed production. Larger animals may prey upon these insects or they may provide the necessary proteins for young hatchling whose diet consists almost exclusively of insects. Roughly 85% of a juvenile bobwhite's diet, for example, consists of insects and other animal matter. The chicks feed almost exclusively on insects during the first two weeks of their life.

The height (or vertical structure) of the grassland is also important. Since many different animals use different grasses and forbs for different reasons, it is logical that varying heights of grassland components would be more beneficial than uniform stands of a single height. Birds such as the Northern harrier and Ring-necked pheasant prefer tall grasses, while robins, horned larks and grasshopper sparrows prefer significantly shorter grasses. In fact, all grassland songbirds respond strongly to structural features (height and density) of the vegetation, and each species has is own unique requirements. The habitats preferred by grassland bird species range from low, sparse plant cover to tall, dense vegetation and each species has its own unique requirements.

Grassland Management

Grassland management practices are usually directed toward the maximum production of grasses and forbs, they can be done with a timing and intensity that are wildlife friendly and productive agriculturally. The timing and intensity of harvesting grass is probably the most critical of all the factors that can affect the value of a grassland for both wildlife and livestock and they are also usually the easiest to manipulate. Actively farmed grasslands are usually either cut for hay or used as pasture for livestock.

The management of grasslands to produce both livestock forage and wildlife food and cover is a compatible use of the land. However, it is extremely difficult to have wildlife management and livestock forage production as equal primary objectives. In reality there are frequently trade-offs in either production or habitat and compromises must be made to things such as livestock carrying capacity, amount of acceptable habitat disturbances, the decreases in production of livestock or forage and the quality of that forage after delayed harvest. Managers must be aware of potential compromises and take them into consideration when developing grassland and wildlife management plans.

Hay

Of the actively farmed grasslands, hayfields in West Virginia are probably more attractive to wildlife than are pasture fields. For the most part, hayfields tend to be less disturbed for a longer duration than pasture fields and generally have greater heights of vegetation for longer periods. In terms of quality, farmers often concentrate their nutrient management (fertilizers) on hayfields, which often yields better forage. These areas are often located in more level areas with better soils and are often times located near or adjacent to streams (riparian zones).

When the grassland is cut for hay, the effect is almost immediate. Both the food and cover are removed, causing wildlife to either move to adjacent areas or be exposed to predators. Often time the best quality hay is harvested at the peak times when food, cover, and nesting are the most critical. Hayfields mowed before July 15 provide poor habitat for nesting birds and/or may serve as a "sink" or ecological trap by attracting birds to nest in areas only to lose most nesting bird success from harvesting activities. Studies showed that about 25% of the annual productivity of hayfield-nesting bobolinks was destroyed by hay cropping on an area during a two-year period. Savannah sparrows that were nesting in idle (unmowed) hayfields in Canada also lost about 80% of their nesting productivity once they were mowed.

There are several management strategies that could be utilized to alleviate the destruction of nesting habitat. One method could be to leave the outer thirty feet of the hay field standing or cut it at some later date. Another method is to mow no more than 1/3 of an entire stand in any given year. Mowing could take place in 2-4 year cycles and where possible, mow in strips to maintain some structural diversity. Mowed strips should be rotated across the field. Cool season grasses should be mown no shorter than 4 inches and native warm season grasses no shorter than 8 inches. Mowing should be performed in the spring (March – April) prior to nesting season or after July 15 to encourage vegetative diversity without impacting ground nesting activities or fall food sources. Haying of warm season grasses, unlike cool season grasses and alfalfa, usually occurs after the peak of the nesting season.

Care should be taken when mowing strips in grasslands. Since most grasslands in the state are relatively small, the strip widths of standing vegetation are often narrow. This may lead to increased predation rates for some animals. These small patches of grasslands become attractive to ground nesting birds, and other wildlife, but also become easy focal points for predators leading to the loss of reproductive success. Several explanations have been given for why predation rates are elevated in strip-cover. One explanation is that predators may be more abundant in strip-cover habitats and use strip cover as a travel lane. Another explanation is that the efficiency at which predators may hunt could be greater in strip cover because it has essentially a one-dimensional configuration and predators forage more intensively there. As a general rule, standing strips of vegetation should be greater than 50 feet in width.

Grazing

Grazing as opposed to haying, removes the vegetation over a longer period of time. Livestock may be utilized to manipulate plant composition and succession. This is beneficial to maintaining the quality of herbaceous cover and controlling woody

vegetation. In some instances this method may provide the most benefits with the least amount of impacts. However, this technique should be performed in accordance with a grazing plan and wildlife as the primary objective.

Grazing practices that will improve forage production generally also benefit wildlife. Legume introduction, proper grazing heights as well as proper grazing dates will improve production as well as wildlife habitat. The rate of removal of forage is determined mainly by how many head of livestock are placed on the grazing unit (stocking rate) and how long they are allowed to graze (grazing period).

Once nesting is initiated, grazing will not usually interfere with incubation unless too much cover is removed or the stock density is so high that it causes nest trampling. If stock density is very high as in some rotational grazing systems, there must be sufficient residue for nest initiation and time for nest building, egg laying, and incubation before animals return to the paddock. This requires a minimum of 35 days, nearly matching the optimum preferred rest period for native warm season grasses of 42 to 49 days. A minimum of 8-10 inches of growth should be present in the fall in order for plants to build root reserves for wintering and initiating spring growth. Warm seasons probably should not be grazed 30 days prior to the first killing frost. This residual growth is excellent winter roosting cover and nesting the following spring. Vegetation heights during the nesting season and through the winter months are critical elements of a grassland management plan.

There are mainly two types of grazing in the state. The first type is continuous grazing. Continuous grazing allows livestock in one grazing unit to graze selectively for a long period of time. This is probably the most common method of grazing in West Virginia due to the average size farm, management expense and topography. With proper grazing height management and stocking densities this method can be beneficial to wildlife, livestock, the soil and plant resources.

If managed poorly, continuous grazing may result in the near elimination of the most palatable plants and allows the introduction and spread of plants that are not as favorable to livestock or beneficial to wildlife. Poor management of continuously grazed systems often results in reduced forage production and elimination of wildlife cover and food. Overstocked livestock movement within an area can also destroy nests and nesting habitat. Years of continuous overgrazing will produce less forage over time and if over-grazed for long durations will drastically change the composition of a grassland.

The second method, rotational grazing, may be as simple as switching livestock between 2 grazing units or pastures periodically. Whereas “Management Intensive Grazing”, may require movement of livestock every 1-3 days through elaborate fencing and water networks. This system usually requires more management on the part of the operator, since smaller grazing units (paddocks) are involved.

Rotational grazing provides succulent forage for cattle, while allowing some areas to grow undisturbed. While resting, these undisturbed units serve as wildlife habitat.

Overall, rotational grazing is a better grassland management choice in terms of wildlife. When grasses are rested or the grazing unit is left idle between grazing periods, the

vigor of the plants increases, giving them a chance to grow and multiply. This usually results in increased forage, increased livestock production and improved wildlife food and cover.

Grassland Size

In the grassland-wildlife world bigger is not necessarily better. As with most other habitat components, different species require and use varying size grasslands. For example, larger grasslands have less value for cottontail rabbits and bobwhite quail. These species are considered edge dwelling species. Species such as turkey and pheasant prefer to nest in grass when it is near a wooded or brushy area. They also tend to utilize the "edge" of a grassland where it joins woodlands, old fields and croplands. This transition zone is known as an ecotone or an area where two or more habitat types come together. Although rabbits and quail can fully utilize a grassland of twenty acres, they tend to not use the interior of a very large grassland unless some form of supplemental cover is provided. Rabbits require brushy, escape cover to survive the pressure of predators such as hawks, owls, and foxes. While quail are able to utilize the interior of large, open grasslands, they, too, are most often found along the edges.

Grassland birds require a certain amount of habitat to be present usually in larger contiguous patches. Minimum habitat size varies greatly among species and can also vary geographically. Climate and topography may also influence the minimum size requirement. West Virginia is over 80% forested and grassland components are relatively small in acreage compared to the grasslands of the prairie states. Therefore, the size of the grassland needed to attract individuals of a given species in West Virginia may be comparatively smaller for the same species in the mid-west.

A good rule for all species concerning size may be to maximize the interconnectedness of grassland habitat patches while managing for the best quality of the area as a whole.

A Word about Edge

Although edge is a necessary component for some species (e.g. quail and rabbit), it may have negative effects as well. The presence of woody vegetation, although attractive to woodland-edge birds, may adversely affect grassland species. This is illustrated by the propensity of some grassland birds (e.g., bobolinks, Henslow's and grasshopper sparrows) to avoid wooded edge habitats and may even be a detriment to many species. For example, the Brown-headed cowbird (*Molothrus ater*) is a brood parasitic bird that lays its eggs in the nests of other birds. These host birds then raise the young cowbirds as if they were their own and results in lowered reproductive success for the host birds. For this reason the Brown-headed cowbird has been blamed for the decline of many songbird species. Cowbird parasitism seems to increase with the amount of edge that exists. Edge also may serve as travel lanes and allow predators to move easily from area to area. Studies also have reported that the proximity to wooded edge was more important than grassland size in determining nesting success. Predation and parasitism rates are often greater as nesting is near an edge. The presence of woody vegetation in or near grassland influences the overall habitat suitability for grassland birds.

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Inserts: (Print and insert the following publications between pages 28 and 29)

Grassland Nesting Birds:
ftp://ftp-fc.sc.egov.usda.gov/WHMI/WEB/pdf/GRASS1.pdf

Eastern Cottontail:
ftp://ftp-fc.sc.egov.usda.gov/WHMI/WEB/pdf/cottontail(1).pdf

SOILS INFORMATION

Land Capability Class – is determined by the most severe rating

Slope	Class Rating
0 – 3%	1
3 – 8%	2
8 – 15%	3
15 – 25%	4
25 – 35%	6
35 – 70%	7
Soils with severe flood hazard	5

Flood Hazard	Class Rating
None	1
Occasional or Rare	2
Frequent or Severe	5

Upland soils do not have a flood hazard described. The flood hazard for upland soils is none.

Internal Drainage	Class Rating
Well drained	1
Moderately well drained	2
Somewhat, Poorly and Very Poorly	3

Land Capability Subclass (only class 1 soils do not have a subclass)
s – stoniness
w – wetness, flood hazard
e – potential for erosion

Soil Water Holding Capacity – amount of water available to the plant in the top 40 inches of soil (or to limiting layer or bedrock).
Use table 16.

Available water in the top 40 inches of the soil	AWC Class
0 to 2.5 inches	very low
2.5 to 3.2 inches	low
3.2 to 5.2 inches	moderate
greater than 5.2 inches	high

EXAMPLE PROBLEM:

The following is an example problem. The map unit description, (GuE), and the soil series description, (Gilpin Series), were taken from the Braxton County Soil survey. The correct answers have been marked on the following scorecard.

GuE – Gilpin-Upshur silt loams, 25 to 35 percent slopes

This map unit consists of moderately deep and deep, well drained soils on hillsides, benches, and narrow ridgetops in the central and western parts of the county. The hillsides and benches are commonly dissected by drainageways and land slips occur in places. The soils in this complex are so intermingled that it was not practical to map them separately at the scale selected for mapping. The map unit is about 35 percent Gilpin silt loam, 35 percent Upshur silt loam, and 30 percent other soils.

Typically, the surface layer of the Gilpin soil is very dark grayish brown silt loam about 1 inch thick underlain by 2 inches of dark brown silt loam. The subsoil extends to a depth of 24 inches. The upper 4 inches is yellowish brown silt loam. The lower 17 inches is strong brown channery silty clay loam. The substratum is strong brown channery silt loam that extends to interbedded sandstone and shale at a depth of 31 inches.

The surface layer of the Upshur soil is typically dark brown silt loam about 2 inches thick. The subsoil extends to a depth of 30 inches. The upper 3 inches is reddish brown silty clay loam. The next 9 inches is red clay. The next 12 inches is weak red clay, and the lower 4 inches is weak red silty clay. The substratum is weak red very channery silty clay loam that extends to red and olive shale at a depth of 43 inches.

Included with these soils in mapping are a few small areas of the well drained Lily and Vandalia soils and the moderately well drained Buchanan soils. Also included are a few small areas of soils where stones cover as much as 3 percent of the surface, areas of rock outcrops, areas of soils that slope 15 to 25 percent or more than 35 percent, and areas of soils where more than 75 percent of the topsoil has been eroded. Included soils make up about 30 percent of this map unit.

The available water capacity is moderate in the Gilpin soil and moderate or high in the Upshur soil. Permeability in the subsoil is moderate in the Gilpin soil and slow in the Upshur soil. Runoff is very rapid for both soils. Natural fertility is moderate in the Gilpin soil and moderate or high in the Upshur soil. In unlimed areas, the Gilpin soil is extremely acid to strongly acid. In unlimed areas, the Upshur soil is very strongly acid or strongly acid in the surface layer and strongly acid to mildly alkaline in the subsoil and substratum. The depth to bedrock ranges from 20 to 40 inches in the Gilpin soil and from 40 to 60 inches in the Upshur soil. The Upshur soil has high shrink-swell potential in the subsoil and is highly susceptible to land slips.

Most of these soils are used for woodland. Some areas are used for pasture.

The soils in this map unit are not suited to cultivated crops or hay, but are suited to pasture. The severe erosion hazard in unvegetated areas and overgrazing of pasture are major management concerns. Proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferred grazing in spring until the soils are reasonably firm are major pasture management needs.

The Gilpin and Upshur soils have moderately high potential productivity for trees. Common tree species on this unit include red oak, white oak, black oak, scarlet oak, Virginia pine, and yellow-poplar. Erosion control, the equipment limitation, and plant competition are major management concerns. On the Upshur soil, during wet seasons poor traction and low soil strength restrict the use of equipment. The Upshur soil is highly susceptible to slippage. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is needed to establish a desirable stand. Placing roads and skid trails near the contour, diverting surface water from the

road, establishing and maintaining a crown on the road, and establishing and maintaining sod on bare roadbanks can help control erosion.

Slope and depth to bedrock are the main limitations of the Gilpin soil as site for dwellings and septic tank absorption fields. Slope, slow permeability, high shrink-swell in the subsoil, and slippage are the main limitations of the Upshur soil. These soils are not suited to most urban uses. Selecting alternate sites of soils with fewer limitations is needed. If vegetation on these soils is disturbed, establishing plant cover on unvegetated areas and providing for proper surface water disposal can help to control erosion and sedimentation.

The capability subclass is VIe.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils formed in acid material weathered from interbedded siltstone, shale and sandstone. Gilpin soils are on ridgetops, benches, and side slopes throughout the county. Slope ranges from 8 to 70 percent.

Gilpin soils are on the landscape with the well drained Lily, Myra, Pineville, Upshur, and Vandalia soils and Udorthents and the moderately well drained Buchanan soils. Gilpin soils have less sand in the Bt horizon than Lily soils and less clay in the Bt horizon than Upshur and Vandalia soils. Gilpin soils are better drained than Buchanan soils. They have fewer rock fragments in the control section than Myra soils and Udorthents. Gilpin soils are not as deep as Pineville, Upshur, Vandalia, and Myra soils and Udorthents.

Typical pedon of Gilpin silt loam, in an area of Gilpin-Upshur silt loams, 35 to 70 percent slopes; about 0.5 mile east of the confluence of Barbecue Run with Knawl's Creek; 15 feet north of Knawl's Creek Road in a wooded area; Orlando topographic quadrangle; lat. 38 degrees 49 minutes 40 seconds N. and long. 80 degrees 32 minutes 11 seconds W.

Oi - 4 inches to 1 inch; hardwood leaf litter.
Oe - 1 inch to 0; moderately decomposed organic material.
A - 0 to 1 inch; very dark grayish brown (10YR 3/2) silt loam; moderate fine and medium granular structure; friable; many coarse roots; about 5 percent rock fragments; very strongly acid abrupt wavy boundary.
E - 1 to 3 inches; dark brown (10YR 4/3) silt loam; moderate fine and medium granular structure; friable; many coarse roots; about 5 percent rock fragments; very strongly acid; abrupt wavy boundary.
BE - 3 to 7 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; many coarse roots; about 5 percent rock fragment; very strongly acid; clear wavy boundary.
Bt - 7 to 24 inches; strong brown (7.5YR 5/6) channery silty clay loam; moderate medium subangular blocky structure; friable; common distinct clay films on faces of peds; many coarse roots; about 15 percent rock fragments; very strongly acid; clear wavy boundary.
C - 24 to 31 inches; strong brown (7.5YR 5/6) channery silt loam; massive; friable; few coarse roots; about 30 percent rock fragments; very strongly acid; clear wavy boundary.
R - 31 inches; interbedded sandstone and shale.

The solum thickness ranges from 18 to 30 inches. The depth to bedrock ranges from 20 to 40 inches. Rock fragments of shale, siltstone, and sandstone range, by volume, from 5 to 25 in individual horizons of the solum and from 30 to 65 percent in the C horizon. Unlimed soils are extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

The E horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. Texture of the fine earth material is silt loam or loam.

The BE horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 4 to 6. Texture of the fine earth material is silt loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4 to 6. Texture of the fine earth material is silt loam, or silty clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4 to 6. Texture of the fine earth material is loam, silt loam, or silty clay loam.

TABLE 16 – PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under “Erosion factors –T” apply to the entire profile. Entries under “Organic matter" apply only to the surface layer. Absence of an entry indicated that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion Factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AgB----------	0-7	15-27	1.20-1.40	0.6-2.0	0.12-0.22	3.6-5.5	Low------	0.32	4	1-4
Allegheny	7-43	18-35	1.20-1.50	0.6-2.0	0.13-0.18	3.6-5.5	Low------	0.28		
	43-65	10-35	1.20-1.40	0.6-2.0	0.08-0.17	3.6-5.5	Low------	0.28		
BuE----------	0-4	10-27	1.20-1.40	0.6-2.0	0.11-0.16	3.6-5.5	Low------	0.24	3	---
Buchanan	4-25	18-30	1.30-1.60	0.6-2.0	0.10-0.16	3.6-5.5	Low------	0.24		
	25-65	18-35	1.40-1.70	0.06-0.2	0.06-0.10	3.6-5.5	Low------	0.17		
Cg----------	0-8	10-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-7.3	Low------	0.32	5	2-4
Chagrin	8-35	18-30	1.20-1.50	0.6-2.0	0.14-0.20	5.6-7.3	Low------	0.32		
	35-65	5-25	1.20-1.40	0.6-2.0	0.08-0.20	5.6-7.3	Low------	0.32		
Ch, Cp----------	0-12	7-18	1.20-1.40	2.0-6.0	0.11-0.18	5.1-6.5	Low------	0.24	4	.5-4
Chavies	12-36	7-18	1.20-1.40	2.0-6.0	0.11-0.20	5.1-6.5	Low------	0.24		
	36-65	7-18	1.30-1.50	2.0-6.0	0.08-0.18	4.5-6.0	Low------	0.24		
Cr----------	0-6	5-15	1.20-1.40	2.0-6.0	0.07-0.15	4.5-5.5	Low------	0.17	3	1-5
Craigsville	6-35	5-15	1.30-1.60	2.0-6.0	0.06-0.15	4.5-5.5	Low------	0.17		
	35-65	5-10	1.35-1.55	>6.0	0.04-0.09	4.5-5.5	Low------	0.17		
GaF----------	0-3	15-27	1.20-1.40	.06-2.0	0.08-0.14	3.6-5.5	Low------	0.24	3	.5-4
Gilpin	3-24	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low------	.024		
	24-31	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low------	.024		
	31	---	---	---	---	---	---	---		
GlC* ----------	0-3	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low------	0.32	3	.5-4
Gilpin	3-24	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low------	0.24		
	24-31	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low------	0.24		
	31	---	---	---	---	---	--	--	--	
Lily----------	0-6	7-27	1.20-1.40	0.6-6.0	0.13-0.18	3.6-5.5	Low------	0.28	2	.5-4
	6-23	18-35	1..25-1.35	2.0-6.0	0.12-0.18	3.6-5.5	Low------	0.28		
	23-27	20-35	1.25-1.35	2.0-6.0	0.08-0.17	3.6-5.5	Low------	0.17		
	27	---	---	---	---	---	----	---		
GlD*, GlE*: ---	0-3	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low-------	0.32	3	.5-4
Gilpin	3-24	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-------	0.24		
	24-31	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-------	0.24		
	31	---	---	---	---	---	---	---		
Lily----------	0-6	7-27	1.20-1.40	0.6-6.0	0.13-0.18	3.6-5.5	Low-------	0.28	2	.5-4
	6-23	18-35	1.25-1.35	2.0-6.0	0.12-0.18	3.6-5.5	Low-------	0.28		
	23-27	20-35	1.25-1.35	2.0-6.0	0.08-0.17	3.6-5.5	Low-------	0.17		
	27	---	---	---	---	---	---	---		
GuC*, GuD*, --	0-3	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low-------	0.32	3	.5-4
GuE*, GuF*	3-24	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-------	0.24		
Gilpin	24-31	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-------	0.24		
	31	---	---	---	---	---	---	---		

FORAGE ADAPTATION BY SOIL DRAINAGE CLASS

	Very Poorly Drained	Poorly Drained	Somewhat Poorly Drained	Mod. Well Drained	Well Drained	Somewhat Excess Drained	Excess Drained
Alfalfa				X	X	X	
Annual Lespedeza				X	X	X	X
Birdsfoot Trefoil			X	X	X	X	
Red Clover			X	X	X	X	
White or Ladino Clover			X	X	X		
Bromegrass			X	X	X		
Big Bluestem			X	X	X	X	
Tall Fescue		X	X	X	X	X	X
Indiangrass			X	X	X	X	X
Orchardgrass				X	X	X	
Switchgrass		X	X	X	X	X	X
Timothy			X	X	X	X	
Caucasian Bluestem				X	X	X	X
Bermudagrass			X	X	X	X	X
Little Bluestem				X	X	X	X
Kentucky Bluegrass			X	X	X	X	X
Reed Canarygrass	X	X	X	X	X	X	

IDENTIFYING CHARACTERISTICS

Orchardgrass - Pale green color with prominent ligule.

Tall Oatgrass - Seed has prominent, twisted awns bent 90 degrees at maturity

Smooth Bromegrass - In the middle of each leaf blade there is a wrinkle resembling a 'W'.

Timothy - Seed heads are cylindrical. Bulb or corm just below soil surface.

Tall Fescue - Leaves smooth on the underside and ribbed on the upper side. Leaf edges rough to the touch.

Reed Canarygrass - Large membranous ligule, pointed, often described as papery.

Kentucky Bluegrass - Heads are pyramidal. Leaves are uniform width and boat shaped or keeled at the tips.

Redtop - Leaves are narrow and sharp. Prominent ligule. Heads are pyramidal and reddish in color at maturity.

Switchgrass - White patch of hair at the point where the leaf blade attaches to the stem.

Little Bluestem - Reddish cast in mature stages. Seed has bent awn at maturity.

Big Bluestem - Silky hairs widely dispersed on upper leaf surface. Seed head resembles a turkey foot.

Indiangrass - "Rifle-sight" ligule at the point where the leaf attaches to the stem.

Sweet Vernal - Hairy collar, distinct sweet scent and taste.

Quackgrass - Prominent auricle or "eagle claw" at the point where the leaf attaches to the stem. Prolific rhizomes.

Alfalfa - Leaf edge serrated about ½ way around. Purple flower.

West Virginia Grassland Evaluation Contest

Scenario

This landowner has 320 acre cow/calf operation. He has 50 spring calving cows and 50 fall calving cows. He has 2 herd bulls that are used on both herds. He has been having an 80% calf crop with the spring herd and a 96% calving rate with the fall herd. All spring born calves are sold at weaning at the end of the fall. Fall born calves are weaned at the end of spring. All steer calves are sold at weaning. Fall born heifer calves are retained and grazed through the summer. These heifers are sold at the end of summer. All cows' average weight is 1100 pounds. His calf crop has been 50% heifers. Weaning weights on the heifers has been 550 pounds. They have been gaining 1.5 lbs. per head per day through the summer. The farmer's goal is to maintain current livestock numbers. The farmer is using management intensive grazing. Figure the average weight for the 100 day summer grazing period for calculating forage consumption. He needs to harvest hay from the spring season to feed in the winter in addition to stockpiled fescue. Harvesting and feeding losses have been calculated for the hay.

SYNOPSIS:

50 spring calving cows weighing 1100 lbs. with superior milking ability
50 fall calving cows weighing 1100 lbs. with superior milking ability
2 herd bulls weighing 2000 lbs., each
80% calf crop spring herd
96% calf crop fall herd
550 lbs. weaning weights on fall born heifers
1.5 lb. average daily gain for 100 day summer grazing period
50% of fall born calves are heifers
Figure the average weight of the heifers for the 100 day summer grazing period to calculate forage consumption.
The farmer's goal is to maintain current livestock numbers.
The farmer is currently using management intensive grazing.
Use only whole numbers for calculating.

FORAGE PRODUCTION

PASTURE	ACRES	SPRING	SUMMER	FALL	WINTER
Fescue/lespedeza	120	291,600	210,400	180,000	
Fescue/clover	100	240,000	112,200	200,000	
Fescue	20	59,900	5,800		65,000
Orchardgrass/alfalfa	80	281,600	183,000	190,600	
Minus harvested hay		-335,000			
	320	538,100	511,400	570,600	65,000

Hay available to feed: 218,000 lbs.

ANIMAL WEIGHT

50	Spring Cows	@	1100 lbs.	=	55,000	Calves = 96% X 50	=	48
50	Fall Cows	@	1100 lbs.	=	55,000	48 X 50%	=	24
2	Herd Bulls	@	2000 lbs.	=	4,000	550 + .5 (150)	=	625
24	Heifers	@	625 lbs.	=	15,000			

FORAGE CONSUMPTION

SPRING:

55,000 (spring) (lact) X .03 = 1650
55,000 (fall) (lact) X .03 = 1650
4,000 (breeding) X .025 = 100
3400

3400/.65 = 5231 X 100 = 523,100

SUMMER:

55,000 (spring) (lact) X .03 = 1650
55,000 (fall) (dry) X .02 = 1100
4,000 (nonbreeding) X .02 = 80
15,000 X .03 = 450
3280

3280/.65 = 5046 X 100 = 504,600

FALL:

55,000 (spring) (lact) X .03 = 1650
55,000 (fall) (lact) X .03 = 1650
4,000 (breeding) X .025 = 100
3400

3400/.65 = 5231 X 100 = 523,100

WINTER:

55,000 (spring) (dry) X .02 = 1100
55,000 (fall) (lact) X .03 = 1650
4,000 (non-breeding) X .02 = 80
2830

2830/.65 = 4354 X 65 = 283,000

REGISTRATION FORM

West Virginia Grassland Evaluation Contest

Team Name: _____

Coach / Advisor: _____

Team Members: _____

_____

_____

_____

Address: _____

_____

Phone #: _____

Fax #: _____

E-mail: _____

Please return this form by March 31, 2006 to the following address:

Gary Redden
465 Ragland Rd.
Beckley, WV 25801